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CHAPTER REPORTS

THE WORCESTER POLYTECHNIC INSTITUTE CHAPTER

Four meetings of the Worcester Chapter of the Society of Sigma Xi were held during the year 1915-16. The first, held November 16, 1915, consisted of a short business meeting followed by an account by Professor W. W. Bird and Mr. F. W. Roys of their investigation of Losses in Belt Drives. The second, held January 25, 1916, was addressed by Dr. John E. Bucher of Brown University on The Fixation of Atmospheric Nitrogen. This meeting was open to the public and was attended by a large audience. The third meeting took place April 20, and consisted of a business meeting at which the regular initiation of members was held, followed by an address by Doctor Farrington Daniels on Precision Measurements in Calorimetry.

The Commencement meeting of the Society was held June 5, 1916. At the business meeting which preceded the address of the evening the new officers for the ensuing year were elected, and an amendment to the By-laws was adopted which makes the retiring President *ex officio* a member of the executive committee. It is hoped that this change will secure continuity in the administration of the Chapter. Doctor Allerton S. Cushman, W. P. I., 1888, Director of the Institute of Industrial Research, Washington, D. C., was initiated as an alumni member. At the open meeting which followed, Doctor Cushman gave an address on Science and Civilization. The list of members initiated into the chapter during the current year is as follows:

ALUMNI MEMBERS

Allerton S. Cushman, Worcester Polytechnic Institute, 1888, A.M., Harvard, 1897, Ph.D., Harvard, 1898. Author of: The Corrosion of Iron, Bulletin, Bureau of Chemistry, U. S. Department of Agriculture. The Cementing Power of Road Material, Same. Potash from Natural Silicates, 8th Institute Congress of Applied Chemistry, and other papers.

FACULTY MEMBERS

James C. Davis, B.S., Purdue, 1903, M.E., 1915. Assistant Professor of Mechanical Drawing. Author of: History of Key-seating Machines. Thesis: Notes on Descriptive Geometry, Textbook.

Howard P. Fairfield, Assistant Professor of Machine Construction. Author of: A Twist Drill Dynamometer (jointly with W. W. Bird), Trans. American Society Mechanical Engineers, Vol. XXVI. Induction-motor Planer Drive with and without Fly-wheel, W. P. I. Journal, 1907; and other papers.

GRADUATE STUDENTS

Carroll F. Merrimam, S.B., Harvard, 1914. Thesis: Investigation of the Heat Losses in a Woolen Mill.

S. Thornton Williams, B.S., St. Lawrence, 1913. Thesis: The Cutting Properties of High Speed Steel on Cast Iron.

UNDERGRADUATE MEMBERS—ALL FROM THE SENIOR CLASS

Mechanical Engineering

Harold Nutt. Thesis: Economy Test of an Automobile Equipped with Thermostatic Regulation.

Sidney T. Swallow. Thesis: Tests of a Gasoline-Kerosene Carburetter.

Civil Engineering

Carl H. Burgess. Thesis: Investigation of Pressure Head across Pipe Line.

John P. Comstock. Thesis: Measurement of Stream Flow by Electric Conductivity.

Herbert N. Eaton. Thesis: Design of Reinforced Concrete Slab and Girder Highway Bridge.

Richard W. Young. Thesis: The Design of a Steel Mill Building.

Chemistry

William B. Jones. Thesis: The Corrosion of Iron in Solutions of Electrolytes.

Roy H. Kienle. Thesis: The Catalytic Action of Colloidal Platinum on the Oxidation and Reduction of Iron Sulphate.

Walton B. Scott. Thesis: A Study of the Synthesis of Ethylenedimethylen from Pentaerythrite.

Electrical Engineering

James A. Blair

Wellen H. Colburn. Thesis: A Study of Certain Wireless Apparatus.

Harold A. Maxwell

R. K. MORLEY, *Corresponding Secretary*

THE COLORADO CHAPTER

At the annual meeting of Colorado Chapter, the following were elected members:

- Clifford Banta, A.B., Wabash, 1915. Graduate student in Chemistry; Metallic Compounds of Phthalic Acid.
- Morris Baskin, Senior. Supernumerary Vessels of the Kidney; Supernumerary Lobes of the Lungs.
- Robert Burns, A.B., Colorado, 1915. Graduate student in Chemistry; paper on the Chemistry of Non-aqueous Solutions.
- Dr. Carbon Gillaspie, Professor of Anatomy, Colorado. Supernumerary Lobes of the Lungs; Supernumerary Vessels of the Kidneys.
- Adelbert J. Greene, Senior, majoring in Physics.
- Wilbur A. Hitchcock, Graduate student in Civil Engineering. B.S. (C.E.), Wyoming, 1912. The Economic Design of Mill Buildings.
- Arthur F. Lyster, Senior in Mechanical Engineering.
- Ernest F. Peterson, Senior in Electrical Engineering.
- Raymond C. Staley, Senior in Mathematics.
- Parker R. Whitney, Senior in Civil Engineering.
- Harold S. Worcester, Senior in Mechanical Engineering.

NON-RESIDENT MEMBERS

- Charles R. Burger, Professor of Mathematics, Colorado School of Mines. A.B., Harvard, 1893.
- Florian Cajori, Professor of Mathematics, Colorado College. M.S., Wisconsin, 1886; Ph.D., Tulane, 1894. History of Mathematics, Theory of Equations, and other publications.
- Clarence P. Gillette, M.Sc., Michigan Agricultural College, 1889. Director of the Colorado Agricultural Experiment Station. Many publications in Iowa and Colorado Experiment Station Bulletins.
- William P. Headden, A.B., Dickinson; Ph.D., Giessen. Professor of Chemistry, Colorado Agricultural College. About ninety publications altogether; thirty are on Colorado Experiment Station investigations.
- Stewart L. Macdonald, A.M., Columbia, 1913. Professor of Mathematics, Colorado Agricultural College. Uses and Meanings of Coordinate Systems.

Walter G. Sackett, B.S., Chicago, 1902. Bacteriologist of the Colorado Agricultural College. About fifteen publications in bulletins of the Colorado Experiment Station.

The chapter has taken advantage of the opportunity to elect non-resident members, and feels that this course will do a great deal to bind more closely the scientific forces of the state.

At the meetings of the chapter this past year it was decided to hold a series of meetings open to the public, taking up some single department in the university, as Physics, Chemistry, Mechanical Engineering, etc., and showing the recent progress, problems, etc., of each. This plan has naturally not been carried very far yet but it seems to be well worth working out.

This year the Colorado Chapter has given one meeting to the Chemistry department for a discussion of the Modern Trend and Problems of Chemistry.

At another meeting the subjects of the papers were:
Collecting Snails in Utah, by Junius Henderson
Observations in the Breeding Habits of Flies, A. T. Evans
A Study of the Ternary System, H. A. Curtis

At the annual initiation the papers given were:
Sigma Xi and the Spirit of Science, President O. C. Lester
A Bacterial Disease of Field and Garden Peas, W. G. Sackett
An Economical Study of Structures, W. A. Hitchcock
Agricultural Developments, W. P. Headden

P. G. WORCESTER, *Secretary*

THE PURDUE CHAPTER

During the academic year 1915-16 the society has held six meetings two of which were open to the members of the university community.

November 17, 1915, closed meeting. Professor Albert Smith of the School of Civil Engineering addressed the society on Wind Loads on Buildings, giving a résumé of experiments conducted at Purdue under his direction. A résumé of this address follows:

The object of this investigation was to determine the influence of height, length, and roof slopes in modifying wind pressure on buildings. The results of the work of Irminger, Dines, Langley, and Stanton were briefly described. All previous experiments had been made on very small models in an artificial current of air.

These new experiments were performed on buildings five, ten, and fifteen feet long, with walls varying from two to ten feet in height, with roof slopes of $1/5$, $1/4$, and $1/3$ pitch, and with semi-cylindrical roofs.

The observations were taken by photographing the instrument, which was essentially a multiple draft gage, with sixteen tubes. Fourteen of these tubes led to holes in the building, and two were connected to Pitot tubes outside of and in front of the model. The other ends of the tubes were connected to small 3" x 3" reservoirs exposed to the air inside the house. The tubes were of .2" diameter inside and set up with a known slope, and the reservoirs filled with kerosene until the liquid in each tube stood at the zero point on a horizontal scale behind the tubes. The Pitot tubes gave a base observation from which the pressure inside the house and the velocity of the wind was determined.

In general, the results showed that: (1) there was more suction than pressure on any building; (2) except for low buildings with large span, there was more suction than pressure on the windward roof slope; (3) the effect on roofs of buildings having windward walls open was not nearly so marked as had been supposed; (4) wall height affected very markedly the nature and distribution of pressures over the roof; (5) increased length of building by diminishing the amount, relatively, of the air flowing around the building, increased relatively the amount flowing over, and increased the intensity of forces on the roof.

Approximate standard wind units were proposed, the stresses from which were computed for a building of $1/4$ pitch, and for a building with an arched roof. These stresses were compared with those from the ordinary wind units, and were shown to be different. This difference certainly leads to lack of economy in all trusses, and might lead to unsafe design in some members.

As a practical test and demonstration of the inaccuracy of present wind units, the experiments were successful; as a scientific determination of the laws of pressure and suction variation, the work was unsuccessful. The "structure of the wind" in the locality of the tests was so unequal as to make it necessary to average a number of tests together whose results differed in important features. In a high, steady wind blowing over level plains of indefinite

extent, it would probably be possible to determine exactly the point of change from pressure to suction on roofs of any shape, and for any variation of height and span. It is possible that a relatively simple law could be deduced. Such tests should be made, and probably the regions of trade winds would furnish the proper conditions.

December 14, 1915, dinner for members of the Society at the West Lafayette Club, followed by an address by Professor H. C. Peffer on The Effect of Various Substances in Solution on Portland Cement Mortar. Résumé of Professor Peffer's address follows:

Permanence of cement structures is affected by any agencies which will penetrate the mass and attack the calcium hydrate or other constituents. Of such, the sulphates of the alkalies and alkaline earths appear to be the most common offenders, causing cracking and disintegration. The action of agencies forming soluble salts is practically as destructive, and means of preventing penetration of the material into the mass have been sought by engineers with little success. The present investigation was for the purpose of determining the effect of waterproofing by admixture with mineral oil under ordinary conditions as compared with bare concrete. Vessels were made and exposed to the action of sulphuric, nitric, hydrofluoric, and acetic acids; other solutions used were lard oil, sugar and sodium, magnesium and aluminium sulphates. The duration of the test in the first instance was three months; subsequent observations were made at the end of a year on vessels alone. Briquettes were pulled at the end of 34 days. Acetic acid and magnesium acetate (subsequently used) showed strong attack in 24 hours. The vessels containing the other materials were apparently little affected at the end of a year, with the exception of lard oil, and sulphuric acid, where complete disintegration took place in case of both bare and oil proofed mortar.

January 7, 1916, open meeting. Doctor C. W. Franklin, Lehigh University, addressed the society on Phenomena of Fluid Motion, giving a general summary of the laws of fluid flow and illustrating them. He very ably discussed those parts of the field which had been covered by experimental research and called attention to those which had not.

March 29, 1916, open meeting. Address by Professor Joseph Jastrow of the University of Wisconsin on The Sources of Human

Nature. The attendance was large and much interest was shown in the instructive and able address.

At the business meeting May 15, 1916, held for the purpose, sixteen new members were elected to the Purdue Chapter. This number includes two members from the instructional staff, three graduate students and eleven from the graduating class of 1916, as follows*:

MEMBERS OF THE INSTRUCTIONAL STAFF—3

William Hunt Bates, A.B., Vanderbilt, 1894; A.M., Chicago, 1902; Ph.D., Chicago, 1910. Associate Professor of Mathematics. The Application of Symbolic Methods to the Treatment of Mean Curvatures in Hyperspace. Trans. Am. Math. Soc., Vol. 12. The Curvature of λ -space, $R \lambda$, Represented as Differential Parameters of an n -space Containing $R \lambda$. Bulletin Am. Math. Soc., Vol. 20.

Albert Frederick Wagner, B.S. in E. E., Rhode Island State College, 1910; M.S., Purdue, 1913. Instructor in Physics. Eine Untersuchung der magnetischen Permeabilität bei niedriger Induktionsdichte. Physikalische Zeitschrift, Vol. 15.

GRADUATE STUDENTS—3

Oren Haines Anderson, B.S., Purdue, 1914. I. Digestion Trials with Dairy Calves.

Ira Curtis Hoffman, B.S., Purdue, 1915. I. The Effect of Spraying on the Set of Fruit in Cucumbers.

William Edward Stanley, B.S. in C. E., Kansas, 1912. I. Investigation of Friction Losses in Flow of Water through Straight Pipes, Bends, Valves, and Specials.

MEMBERS OF THE CLASS OF 1916—11

Wilbur Kingsley Abernethy. I. Distribution of Air Currents under Forced Ventilation.

John Herbert Adams. Outstanding general ability and promise of research achievement. Work in course assigned in lieu of thesis.

William Frederick Borgerd. I. Tests of a Burnoil Gas Engine.

Ray Burnell Crepps. I. Investigations of Deformations of Rivet Steel.

*The symbol I preceding a title indicates incomplete research, in progress.

Lawrence Howland Junken. I. A study of Transmission Line Efficiency.

James Douglass Luckett. I. Soil Chemistry and Bacteriology in Relation to Cover Crops.

William Todd Miller. I. Efficiency of Commercial Conduits for Heating Mains.

Edwin Leonard Peterson. I. Distribution of Stress in Riveted Joints.

Elmer Brauer Plapp. I. Comparative Tests of High Voltage Insulators.

Charles Stanley Rhoades, Jr. I. Railroad Telegraph and Telephone Systems.

Lester Yoder. I. Carbon Dioxide in Plant Physiology and Soil Biochemistry.

The above members-elect were initiated into the Society May 20, 1916. The program for the occasion included an address on The Objects and Aims of the Society, by the president, A. M. Kenyon, and an address on The Quality of Research, by Dean C. H. Benjamin.

A buffet luncheon and social hour followed.

R. B. WILEY, *Recording Secretary*

THE NORTHWESTERN UNIVERSITY CHAPTER

The following scientific program for the year 1915-1916 was carried out in full by the Northwestern University Chapter of Sigma Xi.

October 26.

Professor R. G. Hoskins, Chemical Control of Body Functions.

November 17.

Director John F. Hayford, Scientific Problems of Flight and the Best Possible Ways of Attacking Them.

December 9.

Professor Henry Crew, Galileo. (Fall Election)

January 12.

Professor W. S. Franklin, Columbia University, Bill's School and Mine. (Initiation of new members)

February 17.

Professor W. A. Locy, Five Outstanding Events of Biological Progress.

March 9.

Professor S. W. Ransom, Neural Mechanism of Pain.

April 15.

Professor A. I. Kendall, Microbic Warfare in the Intestinal Tract. Dinner and Annual Meeting at the University Club. (Election of new members)

May 18.

Professor Horace J. Byers, University of Washington, The Essential Unity of Science. (Initiation of new members)

The members elected during the year 1915-1916, with list of papers published, are as follows:

SENIORS

Churchill, E. C.

As an undergraduate exhibited deep interest in pure science, and gives promise of success as a research student. Elected to a scholarship at Northwestern University for 1916-1917 in Department of Zoology.

Mason, Michael

As an undergraduate maintained a strong interest in pure science, and gives high promise of success as a research student. Is elected to a fellowship at Northwestern for 1916-1917. Graduated "with honor."

Newton, Roy F.

Has distinguished himself for high grade work in the Department of Chemistry, and has maintained excellent scholarship throughout his entire university course. A man of decided promise in the scientific field.

Shaffer, A. F.

Has distinguished himself for high grade work in the Department of Chemistry, and has maintained excellent scholarship throughout his entire university course. A man of decided promise in the scientific field.

GRADUATE STUDENTS

Anderson, Harvey A., B.S.

Thesis: Residual Stresses in Steel, and the Application of Least Squares to Their Solution.

Ball, Benjamin F., B.S.

Undergraduate Research: Temperature Time Factors as Affecting Pasteurization, also A Thermal Study of the Meadville Gas Supply. Thesis: A Study of the System PbO-SiO_2 .

Bannister, Ruth D., A.B., Assistant in Astronomy.

Thesis on a certain star cluster.

Beers, Catherine V., M.A.

Thesis: The Embryological History of the Air Capillaries of the Avian Lung.

Brown, Frederick L., A.B., Assistant in Astronomy.

Thesis on the relative motions in a star cluster.

Burdick, Earl F., B.S.

Thesis: Structure of Lactose and Its Oxidation Products with the Alkaline Hydrogen Peroxide.

Mortenson, Lawrence G., B.S.

Thesis: Study of Boiler Performance.

Pappenhagen, Louis A., B.S.

Undergraduate Thesis: The Study of Peroxidases in Milk.

Thesis: A Study of Dielectric Constants of Liquids.

Pederson, O. J., M.A., M.D.

Thesis: Two Cases of Atresia Ani et Recti with Pseudohermaphroditismus Femininus Externus. Read before the Chicago Pathological Society, May 10, 1915.

Wernlund, Chris John, Ph.B., Assistant in Chemistry.

Thesis: A Study of the Conductivity of Non-Aqueous Solutions.

FACULTY MEMBERS

Arey, Leslie B., Ph.D., Instructor in Anatomy.

Papers: An Abnormality in the Intestine of Necturus; *Anat. Record*, Vol. 8, 1914. The Orientation of *Amphioxus* during Locomotion; *Journal Exp. Zoology*, Vol. XIX, 1915.

Simonds, James P., B.A., M.D., Dr. P. H., Associate Professor of Pathology.

Papers: Splenomegaly and Bantis Disease; *Jour. Infect. Diseases*, 1908, V, 23. The Esterase Activity of Plain and Dextrose

Broth Cultures of the Typhoid Bacillus; *Ibid.*, 1914, XV, 354 (With A. I. Kendall). Classification of B. Welchii Group of Bacteria; *Ibid.*, 1915, XVI, 31. Sarcoma and Tuberculosis; Bulletin Johns Hopkins Hospital, 1910. Diphtheria and Public Health; Jour. Amer. Med. Assoc., 1911. Laboratory Experiences with Diphtheria; Jour. Amer. Med. Assoc., 1910. Report of a Sanitary Survey of the City of Galveston, Texas, 1913. Practical Hygiene, Part 111, by Gardner & Simonds, St. Louis, 1914. Larsell Olof, M.A., Instructor in Zoology.

Papers: The Development of the Recurrent Bronchi and of the Air-Sacs of the Lung of the Chick; Anatomischer Anzeiger, 47 Band, 1914. The Embryology of the Bird's Lung, Part I, by Wm. A. Locy and Olof Larsell; Amer. Jour. Anat., Vol. XIX, No. 3. Ross, Ellison L., Ph.D., Instructor in Pharmacology.

Papers: Determination of Organic and Inorganic Phosphorus in Meats, by H. S. Grindley and E. L. Ross; Jour. of Biol. Chem., Dec. 1910, Vol. 8, p. 483. Post Anesthetic Glycosuria as Influenced by Diet. Body Temperature, and Purity of Ether, by E. L. Ross and P. B. Hawk; Archives of Internal Medicine, Vol. 14, p. 779. Some Forms of Urinary Nitrogen Affected by the Administration of Dessiccated Thyroid to Dementia Praecox Patients; Arch. Inter. Med., Vol. 12, p. 746. Some Observations on the Abderhalden Reaction with Normal and Pathological Sera, by E. L. Ross and H. D. Singer. Arch. Inter. Med., Vol. 15, p. 724. Peptone Hypoglycemia, by Hugh McGuigan and E. L. Ross; Jour. Biol. Chem., Vol. 22, No. 2. The Similarity and Synergy of Morphine and Strychnine Action, by Hugh McGuigan and E. L. Ross; Jour. Exper. Pharmacology & Exper. Ther., Vol. 7, No. 4. Dextrose and Diastase Content of Blood as Affected by Ether Anesthesia of Animals on Different Diets, by E. L. Ross and Hugh McGuigan; Jour. Biol. Chem., Vol. 22, No. 2.

Walker, Arthur W., B.A.S. Instructor in Bacteriology.

Papers: Studies in Bacterial Metabolism, X—XL; Jour. Infec. Diseases, 1913; Jour. Biol. Chem., 1913; Jour. Med. Research, 1913; Jour. Amer. Chem. Society, 1913, 1914; Jour. Infec. Diseases, 1915. Studies in Acid-Fast Bacteria, I—X; Jour. Infec. Diseases, 1914.

Respectfully submitted,
WM. L. WOODBURN, *Recording Secretary*